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Research Brief: Technical Evaluation of Suspended Sediment Effects on Biological Resources

Issue

Environmental concerns have arisen that suspended sediment concentrations resulting from dredging and disposal plumes can reduce viability of fish eggs, growth and survival of larval and early juvenile fish, growth and survival of bivalves, and movement of larval fish and shellfish into nursery areas from offshore waters. Hypothetically, these effects can occur in several ways, most notably from deposited sediments smothering animals, suspended sediments reducing feeding abilities, or suspended sediments being raised above sensitive life history stage physiological tolerances. The extent to which these observations are likely to occur in the field is unclear. Because relevant field studies have not previously been conducted, resource agencies act conservatively by limiting dredging to months when impacts are theoretically minimal. Ambiguity in the data used to support windows fosters conflict during dredging project coordination.

Research/Objectives

An objective of this research is to characterize the distribution, growth, and survival of larval fish and shellfish in the field and laboratory in the presence and absence of actual or simulated dredging and disposal plumes. This research is also characterizing the transport of larval and juvenile fishes through and around dredged material plumes to determine if plumes act as a barriers or significant sources of stress to these organisms. Precisely defining parameters to be measured in the field requires laboratory testing to fill gaps that presently exist in the literature. Active dredging projects in areas where environmental windows are most restrictive will be examined to compare the abundance and species composition of larval fish and shellfish within and outside dredging-induced plumes. Growth increments of selected larval fish and juvenile shellfish will be determined, and growth rates in the presence and absence of dredging, vessel traffic and storm-induced plumes compared. This information will be integrated into bioenergetic and population dynamics models so consequences of exposure to plumes can be accurately predicted and appropriate guidance to minimize unacceptable impacts developed. A decision framework for protection of critical life history stages by means of technically justified environmental windows will be prepared.

Results/Products

Coordination of collaborative studies with appropriate state and Federal resource agency personnel is under way. Technologies will be developed to provide quantitative measures of organism response to exposure to dredging-induced perturbations. Currently, environmental windows are imposed on dredging projects based on incomplete laboratory studies and minimal anecdotal field observations. Research will lead to peer-reviewed scientific papers upon which informed dredging project management decisions can be based. Knowledge gained from this research will allow environmental windows to be assessed objectively based upon quantitative field

evidence by clearly demonstrating the effects, if any, of dredged material plumes on the growth and survival of early life history stages of fish and shellfish. This research will be completed 30 September 2004.

Research Team

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